



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/633,014

08/01/2003

Yushi Kaneda

NP-0079

4735

30343

7590

12/16/2005

NP PHOTONICS, INC.
9030 SOUTH RITA ROAD
SUITE 120
TUCSON, AZ 85747

EXAMINER

VAN ROY, TOD THOMAS

ART UNIT

PAPER NUMBER

2828

DATE MAILED: 12/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/633,014	Applicant(s) KANEDA ET AL.	
	Examiner Tod T. Van Roy <i>or [signature]</i>	Art Unit 2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 October 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4, 6-15, 20-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 12-15 is/are allowed.
- 6) ☒ Claim(s) 1-2, 4-11, 20-21, 23-25, 27 is/are rejected.
- 7) ☒ Claim(s) 3, 22 and 26 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

The declaration filed on 10/11/2005 under 37 CFR 1.131 is sufficient to overcome the Jiang (US 6816514) reference.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1, 4, 7-10, 20-21, 23 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cai et al. (Haiwen Cai; Xia Jiangzhen; Hao Zhao; Chen Gaoting; Fang Zujie; Kim, I.S.; Yohee Kim; Optical Fiber Communication Conference and Exhibit, 2002. OFC 2002 17-22 Mar 2002 Page(s): 654 - 655) in view of DiGiovanni et al. (US 5237576).

With respect to claim 1, Cai teaches a polarization dependent resonant cavity (inherent since the PZT would induce birefringence and cause a change of polarization) including a fiber chain having a gain medium between fiber gratings (fig.4 doped fiber between gratings) the gain medium not being formed in a polarization maintaining fiber (PM), a pump source (fig.4 LD) that couples energy into the fiber chain to pump the gain medium, and a modulator that applies stress to a non-PM portion of the fiber chain which would inherently induce birefringence and switch the cavity Q-factor to alternately store energy in the gain medium and then release the energy in a laser pulse. Cai does not teach the fiber gratings to be narrowband and broadband. DiGiovanni teaches a fiber laser which uses a narrowband, and a broadband grating. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the polarization-dependent fiber laser cavity of Cai with the gratings of DiGiovanni in order to relax alignment accuracy when forming the gratings (DiGiovanni col.5-6 lines 63-3).

With respect to claim 4, Cai and DiGiovanni teach the laser outlined in the rejection to claim 1, and Cai further teaches the modulator to comprise a piezoelectric transducer (PZT) (fig.4).

With respect to claim 7, Cai and DiGiovanni teach the laser outlined in the rejection to claim 1 and further teach the gratings to be located in separate fibers attached at either end of the multi-component fiber (doped core loop shown to be between each grating) but do not teach the gratings to be formed in passive silica fiber or the gain medium to be formed in an oxide-based multi-component glass fiber. Silica and oxide-based multi-component glass fibers are very well known in the art. It would

Art Unit: 2828

have been obvious to one having ordinary skill in the art at the time the invention was made to locate the gratings in passive silica fibers as well as the gain medium to be formed in an oxide-based multi-component glass fiber, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960).

With respect to claim 8, Cai and DiGiovanni teach the laser outlined in the rejection to claim 1 including the laser pulse to be single frequency (Cai fig.6) and the length of the resonator to be less than 5 cm (DiGiovanni abs.). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the laser of Cai and DiGiovanni with the cavity length of DiGiovanni to enhance mode stability (DiGiovanni col.2 lines 23-29).

With respect to claim 9, Cai and DiGiovanni teach the laser outlined in the rejection to claim 1 but do not teach the full-width half-maximum of the laser pulse to be less than 100 ns, the repetition rate of the laser pulse to be at least 1kHz, or the peak power to be at least 1W. The operational characteristics of the laser are a matter of design choice and intended usage, thus it would have been obvious to one of ordinary skill in the art at the time of the invention to operate the laser device of Cai and DiGiovanni at suitable levels to fit a desired application.

With respect to claim 10, Cai and DiGiovanni teach the laser outlined in the rejection to claim 1, and Cai further teaches the modulator to apply stress to a non-PM portion of fiber, which does not include the gain medium.

With respect to claim 20, Cai teaches a q-switched laser comprising: a resonant cavity including a reflector having a polarization dependent reflection band (inherent that the reflector would have a reflection band which would be dependent on the polarization) centered at a laser wavelength, a gain medium (fig.4), and an additional reflector having a reflection band that overlaps the polarization dependent reflection band (inherent, if this were not present the device of Cai would not function) so that the cavity has a high q-factor at the laser wavelength and polarization, a pump source (fig.4 LD) that couples energy into the resonant cavity to pump the gain medium, and a modulator that affects the polarization of light oscillating in the resonant cavity (fig.4 PZT, would alter the birefringence of the fiber and alter the polarization) which would reduce the q-factor and store energy in the gain medium and then return the q-factor to its high value to release the energy in a laser pulse (basic operation of a q-switch). Cai does not teach the fiber gratings to be narrowband and broadband. DiGiovanni teaches a fiber laser which uses a narrowband, and a broadband grating. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the polarization-dependent fiber laser cavity of Cai with the gratings of DiGiovanni in order to relax alignment accuracy when forming the gratings (DiGiovanni col.5-6 lines 63-3).

With respect to claim 21, Cai and DiGiovanni teach the laser device as outlined in the rejection to claim 20, and Cai further teaches the reflectors and the gain medium to be formed in a fiber chain (fig.4), said modulator applying stress to a non-PM portion of the fiber chain (fig.4) which would inherently alter the birefringence and change the polarization of the light.

Claims 23 and 27 are rejected for the same reasons stated in the rejection to claims 1 and 10 respectively.

Claims 2, 11, and 24-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cai and DiGiovanni in view of Jiang et al. (US 6188712).

With respect to claims 2, 11, and 24-25, Cai and DiGiovanni teach the q-switched laser device, but do not teach one of the gratings to be formed in a PM fiber. Jiang teaches a fiber laser that used a grating formed in a PM fiber. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the laser device of Cai and DiGiovanni with the PM fiber and grating of Jiang in order to exert an additional degree of control over the polarization of the light supported by the cavity (Jiang col.3 lines 35-42).

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cai and DiGiovanni in view of Yao (US 6480637).

With respect to claim 6, Cai and DiGiovanni teach the laser outlined in the rejection to claim 1, but do not teach the retardance of the birefringence to be one-quarter wave of the laser pulse. Yao teaches a PZT/fiber system which varies the retardance of the birefringence from 0 to 2π (Yao, col.2 lines 62-65). It would have been obvious to one of ordinary skill in the art at the time of the invention to choose the

Art Unit: 2828

retardance value to be one-quarter wave, as it is a matter of design choice as to which value is suitable for the intended purpose and is further described by MPEP 2144.07.

Allowable Subject Matter

Claims 12-15 are allowed.

Claims 3, 22, and 26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Claims 3, 12, 22, and 26 are believed to be allowable as a q-switched fiber laser having a polarization dependent cavity formed of a fiber chain, with specific locations of both narrow, in PM fiber, and broad, in non-PM, fiber gratings with a doped fiber between, the cavity's q-factor being modulated by a PZT to vary the polarization dependence of the cavity and change the alignment of the grating reflection bands to store and release energy in laser pulses was not found to be taught in the prior art, or to be an obvious combination of the prior art.

Claims 13-15 are allowable as they depend from allowable claim 12.

Conclusion

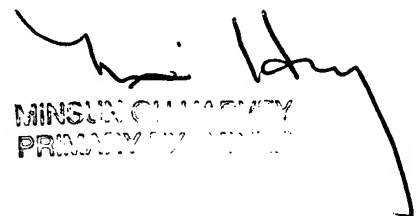
Art Unit: 2828

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tod T. Van Roy whose telephone number is (571)272-8447. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun Harvey can be reached on (571)272-1835. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TVR


MINSUN HARVEY
PATENT EXAMINER